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ABSTRACT

The purpose of skills-training needs-assessment is to identify what type of skills and knowledge are needed to support economic strategies and, as a result, improve organizational decisionmaking related to training investments and general work force development. This paper presents findings of 11 skills-retraining, needs-assessment, action-research studies, which were conducted from 1987 to 1989. The studies sought to gather information about skills-needs-assessment processes, their supporting theoretical bases, and work force training and deployment-decision paradigms. The studies involved six organizations, two industries, and two regional planning efforts. The paper describes a set of interactive issues that relate to locus and type of control, purposes, and type of needs-assessment intervention. It also identifies decision-making paradigms to support work force training and redeployment. Four hypotheses were supported, which conclude that a skills-assessment process should: (1) be client-centered, pragmatic, and focused on utility outcomes; (2) have generalizable, practical outcomes; (3) be grounded in economic, research, and systems theories; and (4) show a relationship between the data and decisions to support work force training. Five figures are included. Appendices contain case-study profiles of the 11 organizations and commonly used decision-making paradigms. (LMI)

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SKILLS NEEDS ASSESSMENT PROCESS TO SUPPORT ECONOMIC DEVELOPMENT

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Skills Need Assessment Process To Support Economic Development

The intended purpose of skills training needs assessment is to determine what type of skills and knowledge (SK) are needed to support economic strategies and, as a result, improve decision making related to training investments, and general workforce development to support economic opportunities of people in geo-political regions. During the period May 1987 to July 1989 a team of researchers conducted a total of eleven (11) skills retraining needs assessment related action research studies. All studies were conducted in response to real strategic planning efforts with the intent of gathering knowledge related to skills needs assessment processes, supporting theory base, and workforce training and deployment decision paradigms.

The purpose of this report is three-fold. First, present and discuss what was learned and/or confirmed from these eleven studies regarding skills needs assessment processes, supporting theory, and paradigms. Second, describe the inter-relationship of skills needs assessment process issue which emerged during the studies. Finally, present a series of decision paradigms which utilize the data sets generated by skill needs assessment processes.

The Scope of The Studies:

The scope of the studies included six organizations, two industries (both encompassing several competing organizations in defined geographic areas), and two regional planning efforts (addressing needs of multiple organizations and industries within a defined area). Seven of these studies were conducted in organizations and industries in the rural central north and south regions of the Commonwealth of Pennsylvania. Two of these studies were conducted in a major urban area, and one each in a small urban area, and a diverse urban region of Ontario, Canada.

In the case of the rural Pennsylvania studies, the organizations were located in small communities and generally represented the primary employer in the community. A brief description of each study situation is provided in the situation summary document (Attachment I).

Hypotheses Undergirding Studies:

There were four hypothesis regarding skills needs assessment processes which guided each of the studies. **First**, to be perceived as accurate and effective, the principle paradigm undergirding a skills needs assessment process must be the mandate to be client owned, pragmatic, and utility outcome focused.

The **second** hypothesis was that clients (users of a skills needs assessment process) infrequently share a common environment, and/or desire different types and sets of information. Therefore, skills needs assessment processes designed to have generalizability beyond a confined environment, must enable outcomes which have utilizability and which are issues focused to all consumers of the data.

The **third** hypothesis was that an effective needs assessment process would be grounded in a multiplicity of current theories relating to economics, research methodology, and systems modeling. As such, it should be possible to describe the relationship of the assessment process to accepted theorems and antecedent research.

The **fourth** hypothesis was that an effective needs assessment process would embody and describe a collection of definable data sets and their relationships to support workforce retraining and/or redeployment decisions. As such, it should be possible to describe the data sets and illustrate decision relationships.

Hypothesis Related Issues:

Bennet (1988), suggests that individuals, work groups, and organizations operate in an environment of turbulent change. Organization behavior theorists describe organizations as open systems whose internal stability can be affected by external forces in the organization's environment. This suggests that a theory based skill needs assessment process must have the ability to consider the variables which influence final determination of appropriateness and accuracy of the needs assessment outcomes.

As discussed, the studies were conducted within a variety of contexts in support of a diversity of strategic planning purposes. Designing a process for these various environments began with a review and assessment of major issues which would be attendant to such efforts. Based on literature and previous research, it was postulated that skills retraining needs assessment processes would need to address four general sets of issues. The issues included:

1. the need for pragmatic research paradigms to support data gathering and analysis,

2. the ability to identify manpower, technology, and systems inter-relationships associated with organizations, and industries within a defined economic framework,

3. the ability to identify skills/knowledge issues attendant to worker groups, technologies, and systems (both current and planned) which are embodied in enterprises contained within the defined economic framework being analyzed, and
4. the need for decision models to direct workforce training and redeployment.

Rationale for addressing these issues relative to the hypotheses for the study were grounded in work by Patton (1983), Geroy (1986), Geroy (1988), Geroy & Wright (1987), Passmore (1988), Passmore, Geroy, and Wang (1989), Swanson and Gradous (1986), Ulschak (1983), Geroy, Wright, & Immel, (1987), Geroy & Irwin (1987), Wright & Geroy, 1990. The over-arching concern embodied in the literature, and embraced by the research team, was that data to be generated by this type of activity had to result from rigorous systematic inquiry, and have validity and utility to decision makers.

Skills Needs Assessment Data Gathering Operational Issues:

The classic processes of task analysis of expert worker performance is discussed in a variety of literature and does not need further elaboration here. However, a variation on the procedure proved to have high utility to the researchers determining training and worker redeployment plans to support current and planned technology and systems.

Utilizing the Swanson & Gradous (1986) task analysis procedure as a base model, the researchers made two modifications to the subject matter expert (SME) skill/knowledge inventory process. These modifications facilitated an opportunity to view SME needs from a technology/systems demand perspective, and provided a more defined inventory of SME skills and knowledge.

The first modification, required that two questions be asked. First, "what are the functional tasks (FT) the technology or system are capable of performing". Second, "what knowledge is needed by SMEs to insure the technology/system (T/S) can accomplish each task within its design capability". This analysis, in two studies, involved working with design and systems engineers while technology to meet specific organization needs was under still development.

However, issues arose concerning proprietary processes when industry wide skills needs assessments were undertaken. The examination of skills and knowledge (SK) required to perform tasks associated with a wide variety of classifications, and organizations, proved to embrace many proprietary operations. Initially, this suggested that industry or regionally wide education and training program planning might be impractical. This issue was addressed with the second modification to the Swanson and Gradous approach to task analysis.

The second modification redefined subject matter knowledge (Swanson & Gradous, 1986) into three distinct categories: generalizable, technical, and basic skills (Geroy, 1988). This classification scheme proved to be highly effective in gleaning proprietary technology/system and knowledge issues from the host of knowledge associated with the industry(s) under examination. Using Geroy's expanded subject matter knowledge category system, technical knowledge was defined as "abstract, but specific to a

process that is unique to an operation, activity, or organization...Frequently...focused on a proprietary process or element in an organization " (Geroy, 1988, pg 9-4).

Of consistent import to the role of planners of external and internal training programs, and general workforce development groups, was the issue of worker basic skills. Therefore integrating the determination of basic skills requirement into the expert work behavior analysis was a standard part of the studies conducted. This occurred at both the individual/worker group classification and the technology/systems functional task level of task analysis.

The outcomes of the needs assessment processes modeled after these modified task analysis procedures, were study generated data sets which allowed several analysis to occur. First was the correlation of skills/knowledge (S/K) related to the functional tasks (FT) of technology/systems (T/S) under examination. In addition it was possible to develop traditional SME skill/knowledge profiles which reflected basic skill, proprietary, and generalizable knowledge. This provided the researchers with several pictures of the S/K profile demand of total organizations, industries, and regionally defined economies, from a market driven engineering systems perspective, as well as the supply of worker group capabilities.

Knowledge gleaned regarding the commonality of non-proprietary skills/knowledge issues proved to have great utility in developing feasible curricula for general workforce development specific to the region or industry in question. This information had high strategic planning value to members of the education and training infra-structure in the environment of the studies. The "left over" skill/knowledge then became the basis for individual organization based training whose content focused on the proprietary knowledge and skill issues.

The "Straw Worker" Phenomena:

During the studies, knowledge coefficients (Geroy, 1988), became the organizer for relating SME skills and knowledge to labor inputs associated with specific current and/or planned desired task accomplishments. Knowledge coefficients are those skill/knowledge factors which are related to SME and technology/system functional tasks and allow SME to accomplish tasks.

In practice, "straw workers" were constructed to represent subject matter expertise related to current or future technology systems and/or worker classification needs. The manipulations of coefficients into "straw worker" skill/knowledge portraits is an extension of Leontief's (1966) input/output economic theorem. Passmore, 1988, adapted Leontief's model to describe interindustry labor supply/demand relationships. As with Leontief's and Passmore's input/output modeling, Geroy, (1988) suggested that by identifying desired outputs (task accomplishment) of strategic

plans, we can determine combinations of skill/knowledge input variables which can accomplish each desired output.

During the studies, the researchers configured input "coefficients" into knowledge/skill portraits of either new worker classifications based upon job task realignment, or redefining an existing job classification to address new technology/system task capabilities. This allowed researcher and organizations to plan workforce training and/or redeployment in a manner consistent with Leontief's (1966), and Passmore's (1988) input/output economic planning models.

Several decision paradigms utilizing these skill/knowledge data sets evolved during the studies. The data sets included; a) currently applied worker group skill/knowledge by task, b) the functional task S/K coefficients for each technology/system currently used or under consideration, and c) the total sum of skill knowledge coefficients available (type and quantity) in the environment under examination. The specific elements of each data set are presented in figure 1.

Figure 1 About Here

The relationship of these data sets as inputs of a workforce training, hiring, deployment plan are illustrated in figure 2.

Figure 2 About Here

An illustration of decision making paradigms embodied in the inter-relatedness of these data sets is presented in attachment 2. Although it is not a definitive list, it reflects many of the common decisions completed during the studies. Employing these paradigms, decision makers believed they were better able to make informed decision about technology/system investment, retraining and education strategies, workforce deployment and redeployment, and hiring. In addition, these paradigms contributed to decisions and strategies regarding withdrawal, maintenance, expansion, and/or entry into market opportunities.

What Was Confirmed and/or Learned During The Studies:

The studies conducted provided information regarding a variety of issues related to needs assessment process. These included:

a. types of systematic skills needs assessment interventions which are possible,
b. processes and issue common to skills needs assessment (regardless of type of intervention),

c. skills needs assessment purposes,
d. degree, types, and locus of control for skills needs assessment processes, and
e. workforce training, deployment and redeployment decision paradigms.

Three types of proactive and reactive strategic needs assessment interventions were able to be systematically planned and implemented. The types were organization specific, multiple organization single industry focused, and multiple industry geographically defined focused.

Processes and issues which were common to each type of skills needs assessment intervention were:

a. SME skill/knowledge profiling,
b. technology/system functional task S/K profiling,
c. diversity of agendas and need to negotiate a common goal for primary and secondary consumers of needs assessment process and outcome, and the needs assessment resource and process providers,
d. need to make training and redeployment decisions based on sound data regarding workforce capabilities

Organizations involved in the studies expressed two primary purposes for wanting to conduct skills needs assessment. They included planning for current workforce deployment/redeployment, and general labour market workforce development. A third minor purpose was to plan hiring in support of market intervention and/or expansion. The principle purposes proved to be somewhat different for each type of intervention, and constrained by front end strategic decisions related to technology/systems and predispositions to HRD expenditures. The interrelatedness of these issues is illustrated in figure 3. In addition, the issues of purpose and type of intervention are shown in correlation to issues of locus and type of control in figure 5.

Figure 3. About Here

There were different degrees, types, and locus of control and/or influence over needs assessment process, purpose, and outcome which were correlated to different types of organizations. A listing of locus and type of control is presented in figure 4.

Figure 4. About Here

It was observed that the more macro the needs assessment type, and dependent upon resources for the process and resulting workforce development, the less internal control the targeted organization exercised. The relationship of locus and type of control to type of intervention is illustrated in figure 5.

Finally, it was determined that there were decision making paradigms which addressed the skill/knowledge data sets generated by the needs assessment process. An illustration of many of the commonly used decision making paradigms used by decision makers in the studies are summarized on attachment 2.

Conclusion:

It is our conclusion that the experience, information, and data garnered during these studies supports the four hypothesis presented. The following discussions are presented to support this conclusion.

Hypothesis One Discussion

"To be perceived as accurate and effective, the principle paradigm undergirding a skills needs assessment process must be the mandate to be client owned, pragmatic, and utility outcome focused."

The processes for data gathering and analysis utilized an inputs procedure which included top-down, bottom-up, and peer SME contribution and review of data . This proved highly effective in providing client ownership and face validation of data. Utility of data was enhanced expanding the scope of data base to included not only traditional SME task analysis, but the functional task analysis of impacting technology/systems. This multi-dimensional data gathering and validation process was found to be equally effective in multi- organizational and industry situations, as well as the single enterprise.

Hypothesis Two Discussion

"Clients (users of a skills needs assessment process) infrequently share a common environment, and/or desire different types and sets of information. Therefore, skills needs assessment processes designed to have generalizability beyond a confined environment, must enable outcomes which have utilizability and which are issues focused to all consumers of the data."

The needs assessment processes applied during the studies showed pragmatic application in varied environments. The environments being defined by type of organizational client intervention profiles. Client profiles were three types:

a. single organizations,
b. regionally defined multi-industry (multiple dissimilar organizations), and
c. non-regionally defined single industries (multiple similar organizations).

The specifics of the assessment instrumentation and processes evolved out of direct input from stakeholder groups. The influence of the stakeholder's contributed to a reduction in irrelevant and redundant data from decision processes. It was also shown in the studies that had processes based in stakeholder input resulted in greater acceptance of the data's validity, and a greater willingness to compromise to achieve solutions reflective of the data and greater need of total affected groups.

Hypothesis Three Discussion

"Effective needs assessment process would be grounded in a multiplicity of current theories relating to economics, research methodology, and systems modeling. As such, it should be possible to describe the relationship of the assessment process to accepted theorems and antecedent research."

Economic Theory Base

The processes were grounded in the same economic principles which explain interindustry labor input/output processes (Passmore, 1988, Passmore, Geroy, Wang, 1989). Theorized by Geroy, 1988, was the concept that knowledge articulated as inputs to task accomplishment can be viewed in the same manner as technology coefficients in any input/output economic planning model. As such, during the studies, task accomplishment was viewed as a function of the availability of a given type and quantity of knowledge.

Viewing the total of knowledge and skill used, plus knowledge possessed but not used, as the total available supply of knowledge coefficient inputs for a finite set of tasks to be accomplished, (by SME group or technology/system's functional tasks) it was possible to determine current and anticipated shortage and surplus of skills to address strategic planning within defined economic environments. This supply/demand model proved effective for decision process regarding workforce training and deployment, especially as it related to worker deployment and redeployment planning based on new technology and systems needs. This concept is embodied in figure 2.

Research Methodology Theory:

The data gathering strategies used in these studies were grounded in the evaluation research model developed by Geroy, 1986, and reported by Geroy and Wright, 1988. Supported by Patton's premise (1982) that a stakeholder based data gathering design model provides data which is most apt to be client focused and have

utility, the studies' interventions validated the evaluation research model in all instances.

This was particularly evident in the situations eleven and eight. The data gathering strategies (research designs) were initially developed external to the client organization and without target groups' input. This resulted in resistance and devaluation of the original skills needs assessment process. However, when given opportunity to have input into the data gathering design, collection, and analysis process, the client organization target groups proved to be helpful and enthusiastic. In addition, the resulting data proved to have a high degree of face validity to decision makers and contributed strongly to the acceptance of decision outcomes by groups effected by the needs assessment based decisions.

Systems theory:

Much has been written regarding systems theory. In these studies, the needs process was continually scrutinized to determine if it exhibited or invoked systems characteristics . This included processes directed at workgroups, organizations, industries, and multi-industry defined regions. In all scenarios it was determined that planned change enhanced by a systematic assessment process could be projected by understanding the inter-relatedness of organizations, industries, and attend workgroup and technology/systems knowledge skill issues. In the studies, the domains under examination proved to exhibit open system characteristic and subject to impact by their external environment.

The skills needs assessment process and outcomes impacted the development of the rules and guidelines for future inter-activities and relationships between elements within the environments being studied occurred. In this regard, the classic systems theory premise that if you tinker with one part, effects most likely will be felt in other parts of the proved to be present and a reliable basis for outcome planning.

Hypothesis Four Discussion

"An effective needs assessment process would embody and describe a collection of definable data set relationships to support workforce retraining and/or redeployment decisions. As such, it should be possible to describe the data sets and illustrate decision relationships."

The supporting processes of all eleven studies, made it possible to development related sets of data which supported a consistent set of paradigms for decision related to workforce deployment and training. The data sets have been described and presented in figure 1. The resulting paradigms are summarized in attachment 2. The inter-relationship of these paradigms as an process to support planning is embodied in the illustrated in figure 2.

Summary:

Much was learned about the use of skills needs assessment process beyond the traditional organizational framework to support strategic planning for economic development. The studies confirmed the existence of an economic, research, and systems theory base for planning assessment strategies. In addition, a set of interactive issues emerge relating to locus and type of control, purposes, and type of needs assessment intervention. A summative illustration of the inter-relatedness of these skills needs assessment issues gleaned from the studies is presented in figure 5. Finally we described a data set of skill/knowledge coefficient identified decision making paradigms to support workforce training and redeployment in response to both individual organization and larger needs.

Figure 5. About Here

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ATTACHMENT I

Case Study Profile of Research Interventions

Situation One:

A manufacturing organization located in a small rural town. Plant site is one of several in a multi national organization. Plant is the major employer in area. Organization had to decide whether to close plant and thereby impact economy of community or invest 24 million dollars in total facilities and technology renovation. Ultimate outcome of this renovation would be state of art cell manufacturing processes utilizing 10 worker classification vs current 35. Capacity to assume plant processes existed in other plants. Of primary concern in the decision was whether workforce could economically be retrained, what kind of training was needed, and what workforce redeployment strategy could be implemented with minimum workgroup disruption.

Situation Two:

Reorganization of a rural community based manufacturing plant would result in cell manufacturing utilizing new technology and self directed workgroup processes. Phase in of new technology would occur over a five-year period, with creation of new job classifications and the elimination of several others. What training would be required to update current union classifications to support new cell manufacturing classifications and self directed workgroup processes.

Situation Three:

Intense international competition and general archaic state of steel industry impressed the need to merge maintenance worker classifications within a steel plant to support an economic survival plan. Desired outcome of plan would be maintenance personnel who would possess a primary expertise and two supporting expertise. A renegotiation of labor contract supported this "multi-craft" approach to performing tasks normally accomplished by a team of several content experts. What skill and knowledge was currently required to deal with all systems and equipment maintained by the various current craft experts, and what retraining would be required to develop the multi-craft maintenance group.

Situation Four:

Rural community based manufacturing firm of space age polymer based technology products wished to develop a long range training strategy to provide general upgrade of workforce in anticipation of new technologies and markets. Immediate goal was to bring all workers in each technology area to same level of competence and identify training content to support anticipated new technology development. Secondary goal was to provide information to local technical school in order to update and create curriculums supportive of organizations anticipated workforce needs.

Situation Five:

Manufacturing firm in small city experiencing difficulty finding qualified craft personnel in local area wished to embark upon a internal strategy to address attrition current maintenance craft classification. Goal was to upgrade all maintenance personnel to same level of expertise with current craft classifications and then implement a multi-craft maintenance strategy to provide advancement opportunities for workers and provide more flexibility within organization. Additional goal was to provide local vocational technical school with current knowledge skill needs to support curriculum upgrade.

Situation Six:

The outcome of a joint effort between a rural county economic development staff, representatives from the wood products industry, and a local vocational technical school was the desire to examine how an economic development initiative could be implemented to increase value added products from the county's wood products industry. The 17 organizations in the industry ranged in size from six to 40 workers and represented a wide variety of final demand wood products. The need was to examine new technology and processes which could be purchased and/or shared, determine retraining needs for the industry, and develop a technical curriculum to provide future workers to the industry.

Situation Seven:

The largest concentration (approx. 90%) of organizations in the U.S. involved in the Powdered Metals Industry are located in a three rural county area. The industry had experienced a loss of 8 percent of world market share in the immediate three period. The local economic development commission and representatives from the industry determined a need to upgrade technology, provide upgrade training to industry employees, and still maintain a high degree of organizational insulation regarding proprietary technologies and

processes. The utilization of similar technologies and processes across all organizations was not consistent. The need was to identify the training content which utility across all organizations and specific training content for proprietary technology and processes unique to individual organizations. The generalizable content was to be delivered through cooperative training at a training site established by the local economic development commission. The site would continue to be used for retraining displaced workers in the regions for the powdered metals industry.

Situation Eight:

The province of Ontario's "Ontario Skill" program was a multi-million dollar provincially funded scheme. The goal of the study was to evaluate the current needs assessment process and offer an alternate strategy which could be systematically and consistently implemented across a variety of types and size of economic frameworks of concern.

Situation Nine:

A rural county was experiencing a high degree of young work emigration and loss of locally owned and operated business and industry. The local secondary vocational technical school in consort with the local private industry council desired to do a feasibility study to examine economic development options for new and/or expanding business and industry opportunities. The information would be used to support county and state resource allocation for infra-structure development and attendant curriculum to support education and training for the emerging and current workforce. The need was to determine what existing workforce skills could support the various economic development options under consideration, and what new vocational programs could be implement to support these various options.

Situation Ten:

A space age technology and research organization in a major metropolitan area was concerned about specialized technician retention due to a perceived lack of career ladder opportunity. The need was to determine what cross career ladder opportunities to non-technical areas existed for technicians and the type of training support that would be needed to facilitate such a cross-career ladder pathing.

Situation Eleven:

A large manufacturing firm of construction equipment was attempting to complete a needs assessment process. They were experiencing difficulty achieving union and management cooperation implementing an externally developed needs assessment process. The need was to evaluate and if necessary design an assessment intervention to aid in determining training to support implementation of a multi-craft maintenance group, and new computer aided manufacturing systems.

Attachment 2

Illustrations of Skill/Knowledge Coefficient Based Workforce Training, Redeployment, Hiring Decision Paradigms

Data Set 1: Skill/Knowledge Profile by Task

A1 Current Skill/Knowledge Coefficients utilized by existing workgroup to accomplish a current task

A2 Anticipated Skill/Knowledge Coefficients to be utilized by existing workgroup to accomplish a new or modified task

Data Set 2: Skill/Knowledge Profile by Technology/Systems Functional Task

B1 Current Technology/System Functional Task Skill/Knowledge Coefficient Requirements

B2 Planned Technology/System Functional Task Skill/Knowledge Coefficient Requirements

Data Set 3: Summative Skill/Knowledge Supply Profile

C1 Total Available Knowledge Coefficients Internal to Planning Environment (all workgroups/all tasks)

C2 Total Available Knowledge Coefficients External to Planning Environment (all workgroups/all tasks)
- a. other available market environments
- b. workforce not participating in labour market
- c. other (emerging workers in school and training)

	S/K Coefficient Relationship	Action Options
1.	$A1 < A2$	train or hire
2.	$B1 < B2$	exercise C2 option
3.	$\Sigma A1 < \Sigma B1$	train or hire but not redeploy
4.	$\Sigma A1 > \Sigma B1$ or $\Sigma B2$	Exercise A2 Option to redeploy Review Supply in C2a & C2c and consider new market strategy

5.	$\Sigma A2 < \Sigma B2$	Train or hire but not redeploy
6.	$\Sigma A1 > A2$ & $> B2$	Redeploy
7.	$\Sigma A1 < \Sigma B2$	Train or hire
8.	$\Sigma A1 > \Sigma B2$	Redeploy, Review Supply in C2a & C2b and consider new market options, Review additional tech/systems options
9.	$\Sigma A2 < \Sigma B1$	train or hire
10.	$\Sigma A2 > \Sigma B1$	Redeploy, Hire from C2a & C2c
11.	$\Sigma C2acA1 < A2$ or B2	Examine technology, Revise Education & Training Delivery Infra-structure Content & Recruit From C2b & train
12.	$C1 > B2$	Redeploy
13.	$\Sigma C1C2a < B2$	Revise Education & Training Delivery Infra-structure Content & Recruit From C2b & train
14.	$\Sigma C2ab > C1$ & $C1 < B2$	Hire

Note: While this is not an exhaustive set of relationships, it serves to illustrate skill/knowledge coefficients as inputs into a supply and demand matrix.

Data Set 1: Skill/Knowledge Profile by Task

A1 Current Skill/Knowledge Coefficients utilized by existing workgroup to accomplish a current task

A2 Anticipated Skill/Knowledge Coefficients to be utilized by existing workgroup to accomplish a new or modified task

Data Set 2: Skill/Knowledge Profile by Technology/Systems Functional Task

B1 Current Technology/System Functional Task Skill/Knowledge Coefficient Requirements

B2 Planned Technology/System Functional Task Skill/Knowledge Coefficient Requirements

Data Set 3: Summative Skill/Knowledge Supply Profile

C1 Total Available Knowledge Coefficients Internal to Planning Environment (all workgroups/all tasks)

C2 Total Available Knowledge Coefficients External to Planning Environment (all workgroups/all tasks)

a. other available market environments
b. workforce not participating in labour market
c. other (emerging workers in school and training)

Figure 1. Skill/Knowledge Coefficient Data Sets

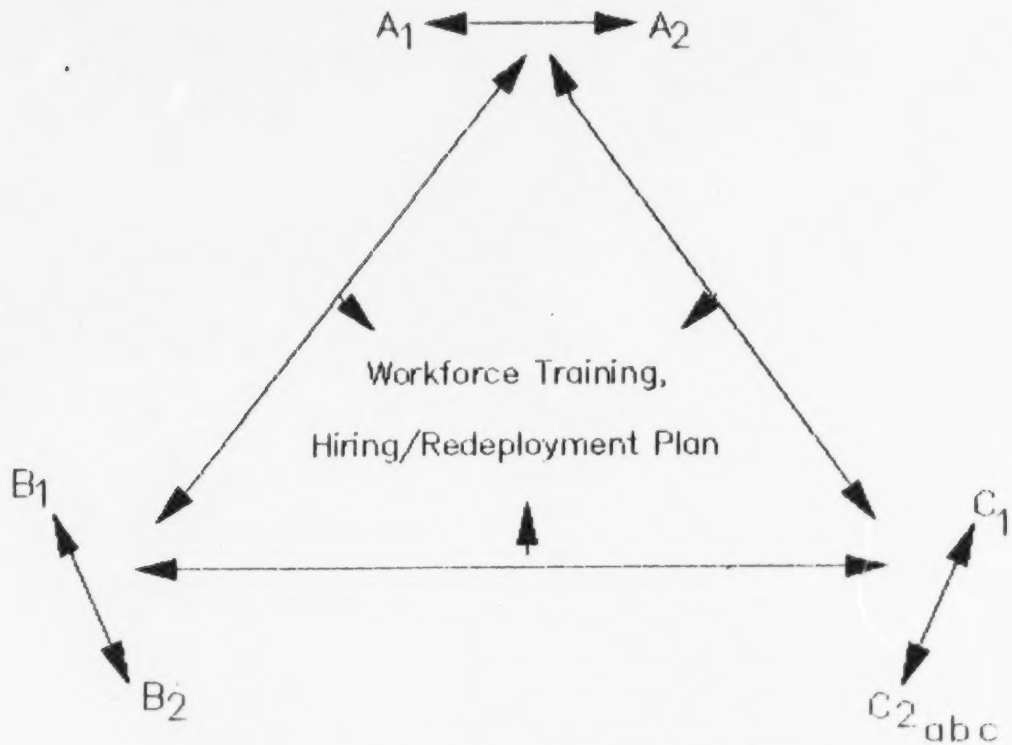

Figure 2. Knowledge Coefficient Input
To Strategic Workforce Plan

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Intervention Type	Needs Assessment Support Purpose - Technology/system strategy decision - HRD Resource Expenditure Predisposition
Organization Specific	A. Workforce Deployment/Redeployment - Current Technology/Systems - Use existing skill/knowledge
	B. Workforce Deployment/Redeployment - Current Technology/System - support change skill/knowledge with principle internal resources
Industry Wide Multi-Organization	C. Workforce Deployment/Redeployment - New Tech/Systems - Use existing skill/knowledge
	D. Workforce Deployment/Redeployment - New Tech/Systems - support change in skill/knowledge with principle external resources or collaborative resources
Regionally Defined Multi-Industry	E. Workforce Re- Preparation in response to proactive economic development strategies - market and infra-structure manipulation - change in infra-structure Skill/Knowledge delivery content - policy development regarding training and education resource distribution - support change in skill/knowledge with principle external resources

Figure 3. Skills Needs Assessment Purposes, Situation, and Resource Strategy Constraints Grid

Locus of Control:

1. Internal to affected decision makers
2. External to affected decision makers

Type of Control:

a. Contractual/Legal
b. Formal Policy
c. Informal Policy
d. Regulatory
e. Social
f. Political

Figure 4. Locus & Type of Control

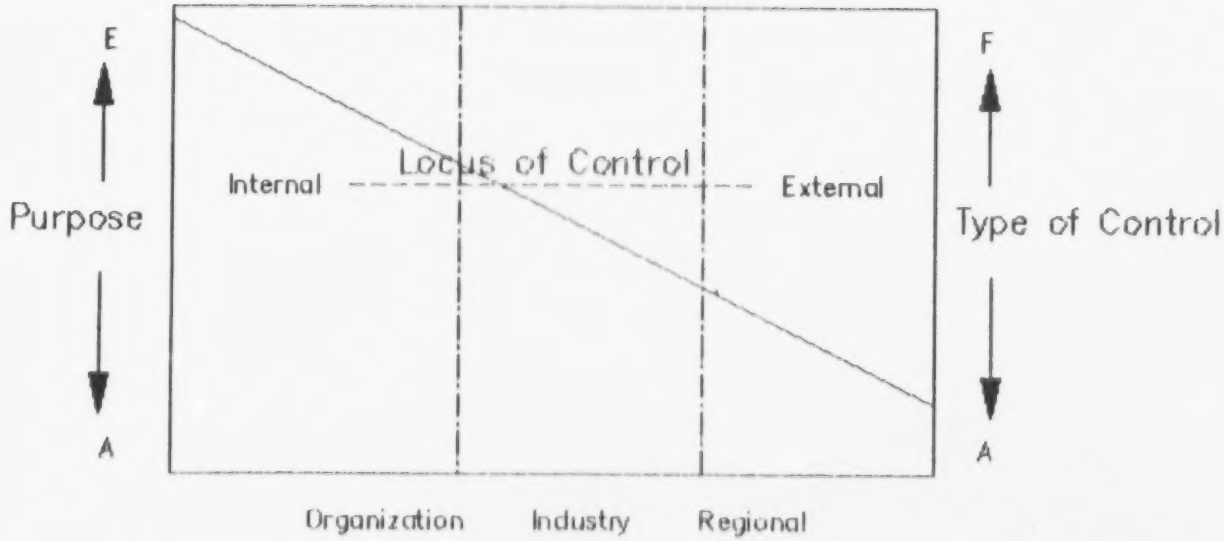

Figure 5. Skills Needs Assessment
Interdependent Issue Grid